

## PATENT ABSTRACTS OF JAPAN

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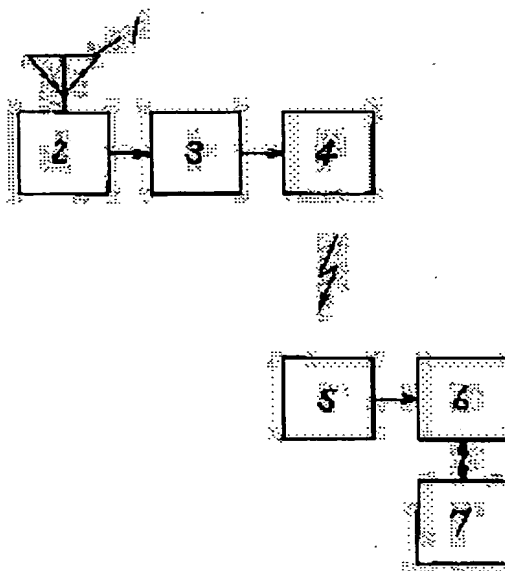
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## (54) RADIO TRANSMITTER DEVICE

## (57)Abstract:

**PURPOSE:** To provide a radio transmitter device which performs the radio data communication during the gap of the radiation of undersired electromagnetic wave by avoiding these waves out of an electromagnetic field where the undesired electromagnetic waves are intermittently radiated.

**CONSTITUTION:** A radio transmitter device is provided is provided with an antenna 1, a detection means 2 which detects the electromagnetic waves received through the antenna 1 and outputs a detection signal, a deciding means 3 which decides the presence or absence of the undersired electromagnetic wave by the detection signal and outputs a 1st deciding signal, a wireless transmitter means 4 which transmits the 1st deciding signal in a wireless state, a wireless receiver means 5 which receives the deciding signal from the means 4 and outputs it as a 2nd deciding signal, a radio transmitter means 6 which transmits the data, and a memory circuit 7 which stores the data to be transmitted. Then the means 6 reads out the data out of the circuit 7 and also transmits them during the gap of the radiation of the undesired electromagnetic waves based on the 2nd deciding means.



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## CLAIMS

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### [Claim(s)]

[Claim 1] An antenna and a detection means to detect the electromagnetic wave received with said antenna, and to output a detection signal, A judgment means to judge the existence of an unnecessary electromagnetic wave with said detection signal, and to output as 1st judgment signal, The wireless transmitting means which carries out wireless transmission of said 1st judgment signal, and a wireless receiving means to receive the sending signal of said wireless transmitting means, and to output as 2nd judgment signal, The wireless sending set characterized by transmitting while it has a wireless transmitting means to transmit data, and the memory circuit which stores the data which should be transmitted and said wireless transmitting means reads data to the gap of said unnecessary electromagnetic wave

from said memory circuit based on said 2nd judgment signal.

[Claim 2] The wireless sending set according to claim 1 characterized by providing a power are recording means to accumulate a part of power of the electromagnetic wave received with the antenna, and supplying power to a wireless transmitting means from said power are recording means.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the wireless sending set which communicates data by wireless.

#### [0002]

[Description of the Prior Art] In the ISM (Industrial \*\* scientific [ and ] medical treatment: Industrial, Scientific and Medical) band, wireless data transmission is performed briskly in the U.S. in recent years, and there is a motion which releases an ISM band (2 or 4GHz band) to wireless data transmission, such as wireless LAN (Local Area Network: Local Area Network), also in Japan.

[0003] However, since, as for an ISM band, an industrial device and a medical-application device are also used, these active jamming over wireless data transmission poses a problem. The unnecessary electromagnetic wave of a

microwave oven is mentioned as the example. Shielding of a microwave oven is imperfect and the electromagnetic wave of said frequency band which the magnetron inside a microwave oven emits has revealed it outside. The direct drive of this magnetron is carried out in a single-phase alternative current with half-wave rectification or the current which carried out full wave rectification. Therefore, on an alternating current frequency or its twice as many frequency as this, the intermission of the unnecessary electromagnetic wave is carried out, and it is emitted. Moreover, the power emitted outside from a microwave oven may amount to several 100mW. Therefore, when a microwave oven is used in the office which laid wireless LAN, it is possible that the unnecessary electromagnetic wave which a microwave oven emits blocks wireless data transmission remarkably.

[0004] The conventional wireless data source had transmitted the electromagnetic wave which is not concerned with the existence of radiation of an unnecessary electromagnetic wave, but performs wireless data transmission. Therefore, while performing wireless data transmission, when the unnecessary electromagnetic wave was emitted, the electromagnetic wave for wireless data transmission received active jamming, and the receiving set of wireless data had the problem that the electromagnetic

wave for performing wireless data transmission could not be received correctly, and it could not get over.

[0005]

[Problem(s) to be Solved by the Invention] Thus, when the unnecessary electromagnetic wave was emitted, even if it compared and the radiation was carrying out the intermission, data communication had the problem which receives active jamming remarkably. Then, although offering a means to detect the existence of an unnecessary electromagnetic wave exactly and to perform wireless data transmission in the gap of an unnecessary electromagnetic wave was called for, it was difficult to perform detection of an unnecessary electromagnetic wave exactly in the location distant from the radiation source. It is because the electromagnetic-field reinforcement also becomes weak and it becomes difficult to judge whether the unnecessary electromagnetic wave is emitted so that it separates from the radiation source of an unnecessary electromagnetic wave.

[0006] This invention solves the above-mentioned problem and it aims at offering the equipment which detects the existence of an unnecessary electromagnetic wave exactly and performs wireless data transmission in the gap of an unnecessary electromagnetic wave.

[0007]

[Means for Solving the Problem] A detection means to detect the electromagnetic wave received with the antenna and said antenna, and to output a detection signal in order that invention of claim 1 may attain the above-mentioned purpose, A judgment means to judge the existence of an unnecessary electromagnetic wave with said detection signal, and to output as 1st judgment signal, The wireless transmitting means which carries out wireless transmission of said 1st judgment signal, and a wireless receiving means to receive the sending signal of said wireless transmitting means, and to output as 2nd judgment signal, It has a wireless transmitting means to transmit data, and the memory circuit which stores the data which should be transmitted, and while said wireless transmitting means reads data to the gap of an unnecessary electromagnetic wave from said memory circuit based on said 2nd judgment signal, it transmits.

[0008] Moreover, invention of claim 2 possesses a power are recording means to accumulate a part of power detected with said antenna, and supplies power to a wireless transmitting means from said power are recording means.

[0009]

[Function] Invention of claim 1 is judging the existence of an unnecessary electromagnetic wave and notifying a judgment signal to a wireless

transmitting means by the above-mentioned configuration, and a wireless transmitting means makes it possible to transmit data to the gap of an unnecessary electromagnetic wave. At this time, the judgment signal over the unnecessary electromagnetic wave emitted from the location of arbitration can be notified to a wireless transmitting means by using a wireless transceiver means as a notice means of a judgment signal.

[0010] By the above-mentioned configuration, invention of claim 2 can build in the power source of a cell etc., or it becomes unnecessary to receive supply of power from the exterior, and it can make easy installation and a maintenance of a wireless transmitting means.

[0011]

[Example] Hereafter, one example of this invention is explained to a detail.

[0012] Drawing 1 is the block diagram showing the 1st example of this invention. The detector circuit which the antenna with which 1 receives an electromagnetic wave, and 2 detect the electromagnetic wave received with the antenna 1, and outputs a detection electrical potential difference in drawing 1, The judgment circuit which 3 judges a detection electrical potential difference and outputs a judgment signal, a wireless transmitting means by which 4 transmits a judgment signal, A wireless receiving

means for 5 to receive the signal which the wireless transmitting means 4 transmits, and to output a judgment signal, the memory circuit holding the data which 7 transmits, and 6 are wireless transmitting means to transmit while reading data from a memory circuit 7 based on a judgment signal.

[0013] Moreover, as for drawing 2 (A), drawing 2 (B) expresses the judgment signal with which, as for drawing 2 (C), the judgment circuit 3 outputs the detection electrical potential difference to which a detector circuit 2 outputs the power of an unnecessary electromagnetic wave and the electromagnetic wave of wireless data transmission.

[0014] Next, actuation is explained, referring to drawing 1 and drawing 2. First, the electromagnetic wave received with the antenna 1 is transformed into an electrical potential difference in a detector circuit 2. Since the power of an unnecessary electromagnetic wave is [ the interior of a microwave oven, and the neighborhood ] remarkably strong compared with the power of the purpose wave as shown in drawing 2 (A), if an antenna 1 is installed the interior or near a microwave oven, as shown in drawing 2 (B), the output voltage of an unnecessary electromagnetic wave will become high compared with the electrical potential difference of the purpose wave. Then, the judgment circuit 3 judges a detection electrical potential difference on the

threshold electrical potential difference set up between the output voltage at the time of detection of an unnecessary electromagnetic wave, and the output voltage at the time of detection of the purpose wave, as shown in drawing 3 (C), when a threshold electrical potential difference is exceeded, activates a judgment signal and outputs it. The wireless transmitting means 4 has always transmitted this judgment signal with infrared radiation, and the wireless receiving means 5 always receives the signal which the wireless transmitting means 4 transmits, and it notifies this judgment signal to the wireless transmitting means 6.

[0015] In addition, the logic of a judgment signal is the same also at Low Active, although the judgment signal serves as High Active set to High in drawing 2 (C) at the time of unnecessary electromagnetic wave detection.

Moreover, an electromagnetic wave may be used although a signal is delivered and received with infrared radiation between this wireless transmitter-receiver.

[0016] According to a judgment signal, from a memory circuit 7, the wireless transmitting means 6 reads data and transmits this to a period without radiation of an unnecessary electromagnetic wave.

[0017] Moreover, drawing 3 is the block diagram showing the 2nd example of this invention. In drawing 2, the means of 1

to 7 is the same as the 1st example. 8 is a power are recording means to accumulate the signal power which a detector circuit 2 outputs, and the wireless transmitting means 4 operates using the power of the power are recording means 8. By this configuration, the power source of a cell etc. can be built in, or it becomes unnecessary to receive supply of power from the exterior, and installation and a maintenance of a wireless transmitting means can be made easy.

[0018]

[Effect of the Invention] As mentioned above, the existence of the unnecessary electromagnetic wave emitted by carrying out an intermission can be detected, and possibility that wireless data transmission will be blocked by the unnecessary electromagnetic wave can be decreased by performing wireless data transmission in the gap of an unnecessary electromagnetic wave. Moreover, installation and a maintenance of a wireless sending set can be made easy by providing a power are recording means.

power of the unnecessary electromagnetic wave revealed from a microwave oven, and the purpose wave, and the transmit timing of the purpose wave.

(B) is drawing showing the detection signal which a detector circuit 2 outputs.

(C) is drawing showing the judgment signal which the judgment circuit 3 outputs.

[Drawing 3] The block diagram of the 2nd example of the wireless sending set of this invention

[Description of Notations]

- 1 Antenna
- 2 Detection Means
- 3 Judgment Means
- 4 Wireless Transmitting Means
- 5 Wireless Receiving Means
- 6 Wireless Transmitting Means
- 7 Memory Circuit
- 8 Are Recording Means

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The block diagram of the 1st example of the wireless sending set of this invention

[Drawing 2] (A) is drawing showing the

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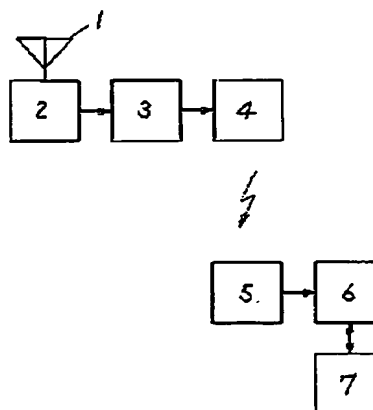
(54)【発明の名称】 無線送信装置

(57)【要約】

【目的】 不要電磁波が間欠して放射されている電磁界中において、不要電磁波を避け、不要電磁波の放射の間隙に無線データ通信を行なう手段を提供する。

【構成】 アンテナ1と、前記アンテナ1で受信した電磁波を検波し検波信号を出力する検波手段2と、前記検波信号により不要電磁波の有無を判定し第1の判定信号として出力する判定手段3と、前記第1の判定信号をワイヤレス送信するワイヤレス送信手段4と、前記ワイヤレス送信手段4の送信信号を受信し第2の判定信号として出力するワイヤレス受信手段5と、データを送信する無線送信手段6と、送信すべきデータを蓄えるメモリ回路7とを備え、前記無線送信手段6が、前記第2の判定信号に基づいて、前記不要電磁波の間隙に前記メモリ回路7よりデータを読み出しながら送信する。

- 1 アンテナ
- 2 検波手段
- 3 判定手段
- 4 ワイヤレス送信機
- 5 ワイヤレス受信機
- 6 無線送信手段
- 7 メモリ回路





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【特許請求の範囲】

【請求項1】アンテナと、

前記アンテナで受信した電磁波を検波し検波信号を出力する検波手段と、

前記検波信号により不要電磁波の有無を判定し第1の判定信号として出力する判定手段と、

前記第1の判定信号をワイヤレス送信するワイヤレス送信手段と、

前記ワイヤレス送信手段の送信信号を受信し第2の判定信号として出力するワイヤレス受信手段と、

データを送信する無線送信手段と、

送信すべきデータを蓄えるメモリ回路とを備え、

前記無線送信手段が、前記第2の判定信号に基づいて、前記不要電磁波の周波数に前記メモリ回路よりデータを読み出しながら送信することを特徴とする無線送信装置。

【請求項2】アンテナで受信した電磁波の電力の一部を蓄積する電力蓄積手段を具備し、前記電力蓄積手段よりワイヤレス送信手段に電力を供給することを特徴とする請求項1記載の無線送信装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、無線によりデータを送信する無線送信装置に関する。

【0002】

【従来の技術】近年米国では、ISM (Industrial, Scientific and Medical) バンドにおいて無線データ通信が盛んに行われており、日本においても、ISMバンド(2.4GHz帯)を無線LAN (ローカルエリアネットワーク: Local Area Network) 等の無線データ通信に解放する動きがある。

【0003】しかし、ISMバンドは産業用機器、医療用機器でも使用されるため、無線データ通信に対する、これらの妨害が問題となる。その一例として電子レンジの不要電磁波が挙げられる。電子レンジのシールドは不完全であり、電子レンジ内部のマグネトロンが放射する前記周波数帯の電磁波が外部に漏洩している。このマグネトロンは、単相交差を半波整流あるいは全波整流した電流で直接駆動される。したがって、不要電磁波は交流周波数あるいはその2倍の周波数で間欠して放射される。また電子レンジから外部に放射される電力は数100mWに達する場合がある。したがって、無線LANを敷設したオフィスにおいて電子レンジを使用した場合、電子レンジの放射する不要電磁波が無線データ通信を著しく妨害することが考えられる。

【0004】従来の無線データ送信装置は、不要電磁波の放射の有無に関わらず無線データ通信を行う電磁波を送信していた。したがって、無線データ通信を行っているときに不要電磁波が放射されると無線データ通信のための電磁波が妨害を受け、無線データの受信装置は無線データ通信を行うための電磁波を正しく受信し復調する

ことができないという問題を有していた。

【0005】

【発明が解決しようとする課題】このように、不要電磁波が放射されると、例えばその放射が間欠していてもデータ通信は著しく妨害を受ける問題があった。そこで、不要電磁波の有無を的確に検出し、不要電磁波の周波数に無線データ通信を行う手段を提供することが求められるが、不要電磁波の検出をその放射源から離れた場所で行うことは困難であった。なぜなら、不要電磁波の放射源から離れる程その電磁界強度も弱くなり、不要電磁波が放射されているか否かを判断することが難しくなるからである。

【0006】本発明は上記問題を解決するもので、不要電磁波の有無を的確に検出し不要電磁波の周波数に無線データ通信を行う装置を提供することを目的とする。

【0007】

【課題を解決するための手段】請求項1の発明は上記目的を達成するために、アンテナと、前記アンテナで受信した電磁波を検波し検波信号を出力する検波手段と、前記検波信号により不要電磁波の有無を判定し第1の判定信号として出力する判定手段と、前記第1の判定信号をワイヤレス送信するワイヤレス送信手段と、前記ワイヤレス送信手段の送信信号を受信し第2の判定信号として出力するワイヤレス受信手段と、データを送信する無線送信手段と、送信すべきデータを蓄えるメモリ回路とを備え、前記無線送信手段が、前記第2の判定信号に基づいて、不要電磁波の周波数に前記メモリ回路よりデータを読み出しながら送信するものである。

【0008】また、請求項2の発明は、前記アンテナで検波した電力の一部を蓄積する電力蓄積手段を具備し、前記電力蓄積手段よりワイヤレス送信手段に電力を供給するものである。

【0009】

【作用】請求項1の発明は上記した構成によって、不要電磁波の有無を判定し判定信号を無線送信手段に通知することで、無線送信手段が不要電磁波の周波数にデータを送信することを可能とする。このとき、判定信号の通知手段としてワイヤレス送受信手段を用いることで、任意の場所より放射される不要電磁波に対する判定信号を無線送信手段に通知することができる。

【0010】請求項2の発明は上記した構成によって、電池などの電源を内蔵したり、外部より電力の供給を受ける必要がなくなり、ワイヤレス送信手段の設置およびメンテナンスを容易にすることができる。

【0011】

【実施例】以下、本発明の一実施例について詳細に説明する。

【0012】図1は本発明の第1の実施例を示すブロック図である。図1において、1は電磁波を受信するアンテナ、2はアンテナ1で受信した電磁波を検波し検波信号

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圧を出力する検波回路、3は検波電圧を判定し判定信号を出力する判定回路、4は判定信号を送信するワイヤレス送信手段、5はワイヤレス送信手段4が送信する信号を受信し判定信号を出力するワイヤレス受信手段、7は送信するデータを保持するメモリ回路、6は判定信号に基づいてメモリ回路7よりデータを読み出しながら送信する無線送信手段である。

【0013】また、図2(A)は不要電磁波と無線データ通信の電磁波の電力を、図2(B)は検波回路2の出力する検波電圧を、図2(C)は判定回路3の出力する判定信号を表す。

【0014】次に、図1および図2を参照しながら動作を説明する。まず、アンテナ1で受信した電磁波を検波回路2で電圧に変換する。図2(A)に示すように、電子レンジ内部および付近では不要電磁波の電力が目的波の電力に比べて著しく強いので、アンテナ1を電子レンジの内部あるいは付近に設置すると、図2(B)に示すように、不要電磁波の出力電圧は目的波の電圧に比べて高いものとなる。そこで判定回路3は、検波電圧を不要電磁波の検波時の出力電圧と目的波の検波時の出力電圧との間に設定されたしきい値電圧で判定し、図3(C)に示すようにしきい値電圧を超えた場合に判定信号をアクティブにして出力する。ワイヤレス送信手段4はこの判定信号を赤外線により常時送信しており、ワイヤレス受信手段5はワイヤレス送信手段4の送信する信号を常時受信して、この判定信号を無線送信手段6に通知する。

【0015】なお、判定信号の論理は、図2(C)では不要電磁波検波時に判定信号がHighになるHigh Activeとなっているが、Low Activeでも同様である。また、このワイヤレス受信機間では赤外線により信号を受受するが、電磁波を用いてもよい。

【0016】無線送信手段6は判定信号にしたがって、不要電磁波の放射がない期間にメモリ回路7よりデータ

を読み出しこれを送信する。

【0017】また図3は本発明の第2の実施例を示すブロック図である。図2において、1から7の手段は、第1の実施例と同じである。8は検波回路2が出力する信号電力を蓄積する電力蓄積手段であり、ワイヤレス送信手段4は、電力蓄積手段8の電力を用いて動作する。この構成によって、電池などの電源を内蔵したり、外部より電力の供給を受ける必要がなくなり、ワイヤレス送信手段の設置およびメンテナンスを容易にすることができる。

【0018】

【発明の効果】以上のように、漏洩して放射される不要電磁波の有無を検出し、不要電磁波の間に無線データ通信を行うことで、無線データ通信が不要電磁波により妨害される可能性を減少させることができる。また、電力蓄積手段を具備することで、ワイヤレス送信装置の設置およびメンテナンスを容易にすることができる。

【図面の簡単な説明】

【図1】本発明の無線送信装置の第1の実施例の構成図

【図2】(A)は電子レンジから漏洩する不要電磁波と目的波の電力と、目的波の送信タイミングを示す図

(B)は検波回路2の出力する検波電圧を示す図

(C)は判定回路3の出力する判定信号を示す図

【図3】本発明の無線送信装置の第2の実施例の構成図

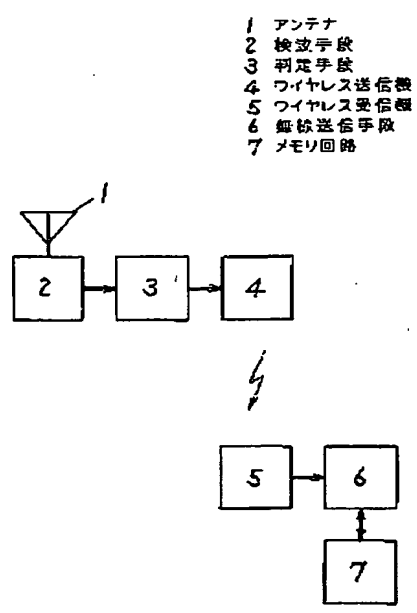
【符号の説明】

- 1 アンテナ
- 2 検波手段
- 3 判定手段
- 4 ワイヤレス送信手段
- 5 ワイヤレス受信手段
- 6 無線送信手段
- 7 メモリ回路
- 8 蓄積手段

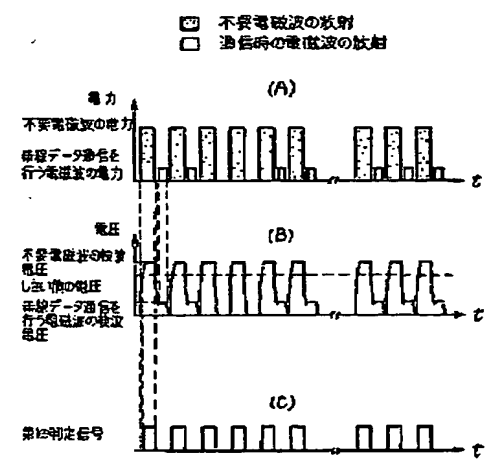
(4)

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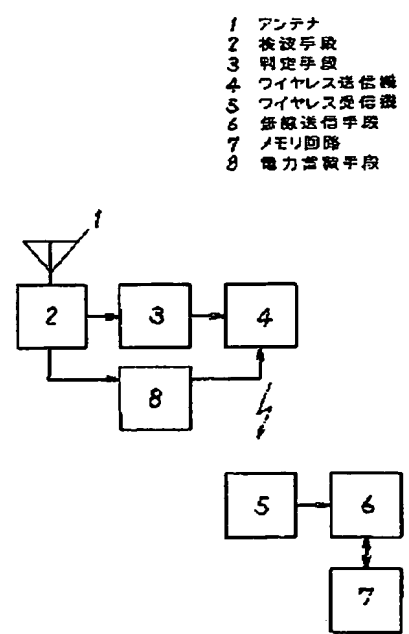
【図1】



【図2】



【図3】



(5)

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